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PRELIMINARY RESULTS OF AN INVENTORY OF ALGAL CAVE, GLACIER NATIONAL PARK, MONTANA, FOR AQUATIC CAVE INVERTEBRATES

A Report To:

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ABSTRACT

Algal Cave (=West Tunnel Cave) in the McDonald Creek drainage of Glacier National Park was visited in September 1999 to confirm the presence of cave isopods that had been reported in the cave in 1998, and to collect vouchers if the isopods were observed. Several aquatic cave invertebrates were reported and collected in the cave in 1977, but apparently these had never been identified, and location of specimens was uncertain.

Six "pools" in the cave were checked for the presence of invertebrates during the September 1999 trip. White isopods were found in all of the pools; estimated number of individuals in these pools was > 800. In addition, a species of aquatic amphipod, at least one species of planaria, and one species of oligochaete worm were present. Vouchers of each species were collected for later determination by experts. The isopod was identified as *Salmasellus steganothrix*, the amphipod was identified as a new and as yet undescribed species of *Stygobromus* (to be named "*glacialis*"), the planaria were not identifiable because of the preservation technique. To date, the oligochaete worm has been identified to the family Lumbriculidae. The aquatic community of cave invertebrates in Algal Cave is the first described for Montana; a similar community may be present in "Zoo Cave", also in the Park, as well as other caves in northwestern Montana with subterranean streams.

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INTRODUCTION

Although Montana harbors a large number of caves (see Campbell 1978), the faunas these caves support have received relatively little attention. Bats are the best-documented taxon, but even this group is poorly studied in the state (see Hendricks et al. 2000 for the only published account of a cave bat fauna). To date, only two species of terrestrial troglobitic (cave obligate) invertebrates (the harvestman *Cryptobunus cavicolus* [= *Sclerobonus cavicolens*] and the springtail *Oncopodura cruciata*) have been described from Montana (Nicholas 1960), both of which are endemic to Lewis and Clark Caverns.

The aquatic cave fauna of Montana is even less well known. Four endemic species of subterranean amphipods in the genus *Stygobromus* have been collected and described from water wells in Montana (Holsinger 1974), but none of these so far have been reported associated with caves. The only description of cave-associated aquatic invertebrates is in the unpublished report by Campbell et al. (1977), that includes accounts of the aquatic faunas from Algal and Zoo caves, both in Glacier National Park. Here are reported an isopod, an amphipod, and a planarian associated in pools in Algal Cave, and an amphipod in Zoo Cave. Voucher specimens collected from the caves in 1977 were sent to experts, but their fates remained unknown. Prior investigations of both caves (Campbell 1975, Campbell et al. 1976) made no mention of the aquatic invertebrates found in each.

The 1999 trip to Algal Cave was prompted by reports from Sam Martinez (Helena, MT) of white aquatic isopods seen in pools in this cave during a trip in 1998. At this time, neither Sam nor myself were aware of the report of Campbell et al. (1977). However, the significance of Sam's observation was appreciated immediately, because 1) I was unaware of any aquatic cave animals reported in Montana, and 2) I knew that as of 1976 there was only one species of isopod known for Montana (Newell 1976), and it was not a cave species. I was also cognizant that the isopod might be *Salmasellus steganothrix*, a subterranean species originally described from the Rocky Mountains of Alberta (Clifford and Bergstrom 1976).

The primary objectives of the 1999 project were 1) identify the isopod species inhabiting Algal Cave, 2) provide a count of individuals occupying the portion of the cave surveyed, and 3) provide a preliminary description of the physical environment occupied by the isopods.

STUDY AREA AND METHODS

Algal Cave (=West Tunnel Cave) is located along Going-To-The Sun Highway in the McDonald Creek drainage of Glacier National Park (T35NR17WS35SENE). The gated entrance is at about 1226 m elevation (4020 ft) with a length of 643 m (2110 ft); the cave is formed in Siyeh Limestone and contains a significant stream passage ending in an impassable siphon (Campbell 1995, Campbell et al. 1976, Campbell et al. 1977). Prior to reaching the stream, a series of pools (connected by a slight surface flow of water) are present, beginning about 60 m (200 ft) from the entrance. The passage is narrow at this point (barely shoulder-width in some places at pool-level). Some of these pools may become dry, depending on season and year.

Collecting equipment was simple: vials with 80% ethyl alcohol for preservation of specimens, a turkey baster, medicine dropper, and an aquariaum dip net all for collecting

specimens, a hand-help thermometer for recording water temperature. Due to the awkward nature of the cave, pool dimensions were estimated. Counts of animals in each pool were made, but these should be considered estimates because of the difficulty of seeing all objects in the water, and difficult accessibility to some pools. A complete cave count was not made, because we ceased our exploration when the stream was encountered.

RESULTS AND DISCUSSION

1999 Survey: Algal Cave was entered on 27 September 1999, and checked for aquatic cave invertebrates up to the 5 m climb, short of the "permanent" stream about 200 m from the entrance (see Campbell et al. 1977 for a cave map). In the cave passage visited, six pools were checked for the presence of aquatic invertebrates. Each pool was occupied by one or more of the four species detected. Water temperature of all pools was about 6.5°C (44°F). There was no surface flow connecting the first pool with the others, but there was increasing surface flow farther into the cave (although the amount was never more than a gentle trickle about 0.5 cm deep). Obviously, at some time during the year there is flow between all pools. Water in the cave stream in early September 1975 was 4°C, with a pH of 7.43 and a hardness of 102 ppm (Campbell 1975). Temperatures on 25 August 1977 of the pools where the first aquatic invertebrate collections were made (Campbell et al. 1977) were 6°C, nearly the value recorded in 1999. The pools are not directly linked by surface flow to the large stream, at least during the visits so far reported, but instead appear to be fed by seeps and rivulets nearer the cave mouth.

All pools were relatively shallow (mostly < 20 cm) and narrow (0.5 m wide) but varied in length from 2-6 m. Pool bottoms were lined with flat pebbles and fine mud or silt that was easily disturbed when capturing specimens, thereby obscuring vision if care wasn't taken to avoid stirring up the pool bottoms. Pools often had organic debris in them (floating bodies of cave crickets, true flies, opiliones ["daddy longlegs"], fragments of vegetation, wood rat droppings, and fungus) that supplied the food requirements of the aquatic invertebrates observed in 1977 and 1999.

The six pools we checked in 1999 (#1-#6 in sequence from the cave mouth) extended from Pool # 1 in Campbell et al. (1977) to the intersection with the rivulet shown on their map. Faunal counts (estimates) for each pool were as follows: Pool #1- ca. 60 isopods; Pool #2- ca. 300 isopods, 6-8 planaria, 1 oligochaete worm; Pool #3- ca. 20 isopods, 10 planaria, 8 amphipods; Pool #4- ca. 300 isopods, 10-20 planaria, 2 oligochaete worms; Pool #5- ca. 40 isopods, ca. 10 amphipods, 15 planaria; Pool #6 and rivulet- ca. 250 isopods, several amphipods, several planaria. Ten isopods total were collected from Pools #1 and 2; four amphipods were collected from Pool #3, three planaria were collected from Pool #4, and one oligochaete worm was collected from Pool #4. The oligochaete worms were not previously reported for Algal Cave (Campbell et al. 1977).

Species Accounts: The following are discussions of the species observed, with expert determinations of species identifications where possible.

Isopods (Class Crustacea): The ten specimens collected in 1999 were sent to Dr. Jerry J. Lewis at the University of Louisville. He identified the isopods as 3 males and 7 females of *Salmasellus steganothrix* Bowman, originally described from Horseshoe Lake, Alberta (see Clifford and Bergstrom 1976), and since reported in Alberta from Cadomin Spring and

Castleguard Cave (in Banff National Park). Other collections have been made from Dead Horse Cave in Skamania Co., Washington and from an unknown location in the Flathead River System near Kalispell, Flathead Co., Montana. Two of the specimens collected in 1977, now in the U.S. National Museum collection, are a male and a female of this species; location of the other two isopod specimens collected in 1977 is not known (J. J. Lewis pers. comm.). The 1999 material will be deposited in the U.S. National Museum collection. The Dead Horse Cave collection is of interest because the species was not included in a description of the cave ecology by Nixon (1975), even though other aquatic cave invertebrates were noted. This seems to parallel events at Algal Cave, where the isopod was not present in pools during some visits (see Campbell 1975, Campbell et al. 1976).

Amphipods (Class Crustacea): The four amphipod specimens in 1999 were sent to Dr. John R. Holsinger (Old Dominion University). Dr. Holsinger identified the amphipods as *Stygobromus* n. sp. (new species, in manuscript) of the *hubbsi* group, to be named "*glacialis*" when the description is formally published. Currently the description is in the dissertation of Daqing Wang (whose doctoral research is the systematics of western North American *Stygobromus*). The 1999 collection included four sexually mature females, two of which were ovigerous and the first seen for this species. The two specimens collected from Algal Cave on 25 August 1977 were not sexually mature, but the two collected from Zoo Cave on 27 August 1977 were nearly sexually mature females (J. R. Holsinger pers. comm.). One additional specimen is known from an unnamed cave on Trail Creek in Flathead Co. (North Fork Flathead River drainage) collected by Dr. Jack Stanford on 25 November 1980. Dr. Holsinger's collection numbers are H-1889 for the 1977 Algal Cave collection, H-1890 for the 1977 Zoo Cave collection, and H-3900 for the 1999 Algal Cave collection. The 1999 material will be listed as paratypes in the formal description.

Oligochaete worm (Class Lumbriculida): The one specimen of segmented worm collected in 1999 from Algal Cave was sent to Dr. Mark J. Wetzel (Illinois Natural History Survey). Dr. Wetzel identified the specimen as a member of the Family Lumbriculidae, but was unable to identify it below that level. He is sending it to a colleague in California for additional help. Any collection of additional specimens should be sent to some other authority, as Dr. Wetzel is not an expert with this group.

Planaria (Order Tricladida): The three specimens of flatworms collected in 1999 were placed directly in ethyl alcohol. This preservation technique ruins the specimens for future identification. To quote Dr. Jerry J. Lewis, "If the flatworms were put in alcohol you can probably give up immediately on trying to identifying them. Even when fixed properly identifying them from preserved specimens is problematic. . . . If pigmented you might try using [Kenk's] EPA key to identifying fresh, living specimens" (pers. comm.). The individuals collected were a light cream color, and appear superficially like illustrations of *Polycelis* (Family Planariidae) in Nixon (1975).

RECOMMENDATIONS

The two worm species may not be cave forms, but this possibility will remain conjecture until additional specimens are collected. It is suggested here that Algal Cave be revisited and additional material be collected and submitted to appropriate authorities for species-level determinations. Furthermore, Zoo Cave and Poia Lake Cave may also support an aquatic cave

invertebrate community similar to that in Algal Cave. *Stygobromus* n. sp. has been collected in Zoo Cave, and some species of oligochaete was collected in Poia Lake Cave (Campbell et al. 1976, Campbell et al. 1977). These caves should be revisited.

The aquatic fauna of Algal Cave is similar to that in Dead Horse Cave, Washington. Each support an isopod (*Salmasellus steganothrix*), an amphipod of the genus *Stygobromus*, and planarian flatworms (Nixon 1975, Campbell et al. 1977, pers. obs.); Algal Cave also supports a Lumbriculid oligochaete. The aquatic cave fauna of Algal Cave is unique in its diversity in Montana, and deserves additional study.

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